

What is claimed is:

1. An integrated interior trim piece for a vehicle comprising:

an upholstery skin material;

a substrate; and

a molded foam material extending between said upholstery skin material and said  
5 substrate, for bonding said upholstery skin material to said substrate.

2. The interior trim piece as defined in claim 1, wherein said substrate comprises a porous material having openings therein, wherein said moldable foam material penetrates said openings and bonds to said porous material through said openings.

3. The interior trim piece as defined in claim 2, wherein said substrate comprises a fiber reinforced mat.

4. The interior trim piece as defined in claim 3, wherein said fiber reinforced mat comprises fiberglass.

5. The interior trim piece as defined in claim 1, wherein said molded foam material is formed on opposite sides of said substrate.

6. An interior trim piece for a vehicle comprising:

an upholstery skin material;

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a molded foam layer bonded to said upholstery skin material; and

a substrate integrally formed within said foam layer, wherein said foam layer forms a  
5 bond between said substrate and said upholstery skin material.

7. The interior trim as defined in claim 6, wherein said substrate comprises a porous fibrous material having openings therein, wherein molded foam penetrates said openings to form a bond to said porous fibrous material through said openings.

8. The interior trim piece as defined in claim 7, wherein said substrate comprises a fiber reinforced mat.

9. The interior trim piece as defined in claim 7, wherein said fiber reinforced mat comprises fiberglass.

10. The interior trim piece as defined in claim 6, wherein said foam layer comprises polyurethane.

11. A method of manufacturing interior trim for a vehicle, comprising the steps of:  
locating a skin material on one die part of a molding tool;  
locating a fibrous reinforcement mat having openings therein on a second die part of said molding tool;

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5       applying a moldable foam-forming material over at least a portion of said skin material and between said skin material and said fibrous reinforcement mat, such that said foam-forming material penetrates said openings in said fibrous reinforcement mat;

          curing said moldable foam-forming material so that said foam-forming material expands and binds to both said skin material and said fibrous reinforcement mat to form a trim piece; and

10       removing the trim piece from said molding tool.

12.     The method as defined in claim 11, wherein said step of applying said moldable foam-forming material comprises dispensing a liquid urethane foam between said skin material and said fibrous reinforcement mat.

13.     The method as defined in claim 11, further comprising the step of performing said method in a reaction-injection molded delivery system.

14.     The method as defined in claim 11, further comprising the step of forming a slush molded PVC skin as said skin material.

15.     The method as defined in claim 11, further comprising the step of providing a fiberglass mat as said fibrous reinforcement mat.

16.     The method as defined in claim 11, wherein said step of curing includes expanding said foam-forming material to provide expanded foam with a varying thickness.

17. The method as defined in claim 11, wherein said step of curing is provided for a period of time in the range of 30 seconds to 120 seconds.

18. The method as defined in claim 11, wherein said step of curing includes heating said molding tool to a temperature in the range of 90° to 150°F.

19. The method as defined in claim 11, wherein said moldable foam-forming material has a final molded density of less than 15 pcf.

20. A one-step method of manufacturing vehicle interior trim having a finish face, a structural reinforcement, and an interstitial layer of foam, comprising the steps of:

locating a skin material on one die part of a two-part die molding tool;

placing a fibrous reinforcement mat having openings therein on a second die part of said

5 two-part die molding tool;

applying a moldable urethane foam material over at least a portion of said skin material and between said skin material and said fibrous reinforcement mat;

closing said two-part die molding tool;

curing said urethane foam material so that said foam expands and binds to both said skin  
10 material and said reinforcement mat, such that said foam-forming material penetrates said openings in said fibrous reinforcement mat; and

removing said cured interior trim from said molding tool.

21. A method of manufacturing interior trim for a vehicle, comprising the steps of:

locating a skin material in a molding tool;

locating a porous fibrous reinforcement mat in said molding tool;

applying a moldable, foam-forming material between said skin material and said fibrous

5 reinforcement mat;

curing said moldable, foam-forming material so that said moldable, foam-forming material expands and binds to said skin material and said reinforcement mat, such that said foam-forming material penetrates openings in said porous fibrous reinforcement mat; and

removing the cured interior trim from said molding tool.

22. The method as defined in claim 21, wherein said step of locating said skin material and said fibrous reinforcement mat in said molding tool further comprises locating said skin material on one die part of said molding tool and placing said fibrous reinforcement mat on a second die part of said molding tool.

23. The method as defined in claim 21, wherein said step of curing includes a step of closing said molding tool.

24. The method as defined in claim 21, wherein said step of locating said porous fibrous reinforcement mat in said molding tool further comprises locating said porous fibrous reinforcement mat on top of said skin material such that a portion of said reinforcement mat rests on top of said skin material.

25. The method as defined in claim 24, wherein said step of locating said porous fibrous reinforcement mat further comprises locating said reinforcement mat such that another portion of said reinforcement mat is separate in space from said skin material.

26. The method as defined in claim 25, wherein said applied foam-forming material penetrates said openings in said porous fibrous reinforcement mat to consume volume between said another portion of the reinforcement mat and said skin material.

27. The method as defined in claim 26 further comprising the step of closing said molding tool subsequent to said step of applying said moldable foam-forming material.

28. The method as defined in claim 21, wherein said moldable foam-forming material is applied and cured on both a front side and a back side of said reinforcement mat.

29. A method of manufacturing vehicle interior trim, comprising the steps of:  
 locating a skin material on one die part of a molding tool;  
 locating a fibrous reinforcement mat having openings therein on said skin material such that said reinforcement mat rests on top of said skin material;

5        applying a moldable, foam-forming material to said skin material and said fibrous reinforcement mat, such that said foam-forming material penetrates said fibrous reinforcement mat; and

curing said moldable, foam-forming material so that said molded foam material binds to both said skin and said fibrous reinforcement mat to form an interior trim piece.

30. The method as defined in claim 29, wherein said step of locating said fibrous reinforcement mat further comprises disposing said fibrous reinforcement mat on top of said skin material such that one portion of said reinforcement mat rests on top of said skin material and another portion of said fibrous reinforcement mat is distanced from the skin material.

31. The method as defined in claim 30, wherein said step of locating said fibrous reinforcement mat further includes the step of preforming said fibrous reinforcement mat into a predetermined configuration.

32. The method as defined in 29 further comprising the step of removing said trim piece from said molding tool.

33. The method as defined in claim 29, wherein said step of applying a moldable foam-forming material further includes applying said foam-forming material on opposite sides of said fibrous reinforcement mat.

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